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# Appendix H

## Economic Impact of Cellulosic Ethanol Production in Treutlen County

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# The University of Georgia

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**Center for Agribusiness and Economic Development**

**College of Agricultural and Environmental Sciences**

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## **Economic Impact of Cellulosic Ethanol Production in Treutlen County**

### **Executive Summary**

A proposed operation for wood cellulosic ethanol production in Treutlen County would lead to economic activity throughout Georgia. Ethanol will be produced by utilizing wood waste and residue from harvested Georgia timber as a feedstock. With a large timber industry, cellulosic ethanol technology makes Georgia a highly desirable location for alternative energy production. Construction of a plant for wood cellulosic ethanol production in Treutlen County would create a one-time economic impact leading to \$19.5 million in labor income for 489 jobs in Georgia. Operation of the plant would create an annual \$105.7 million output impact in Treutlen County. Total labor income of \$5.8 million would be created annually for 194 jobs in the county. Local governments in the county would receive \$498,781 annually in tax revenues due to ethanol production, not including taxes on ethanol sales. Regional impacts for an area of 18 counties including Treutlen County lead to a labor income impact of \$13.6 million for 432 jobs in the region. Production at the plant would generate a total output impact of \$150.3 million for the state economy. Employees in Georgia would earn \$17.6 million in wages and benefits for 444 jobs. The state treasury would receive \$1.6 million annually, and local treasuries throughout the state would receive \$1.3 million from operations related to ethanol production.

## **Economic Impact of Cellulosic Ethanol Production in Treutlen County**

A proposed operation for wood cellulosic ethanol production in Treutlen County would lead to economic activity throughout Georgia. Ethanol will be produced by utilizing wood waste and residue from harvested Georgia timber as a feedstock. Construction activity leads to one-time impacts during the period of building the ethanol plant. Operation generates annual impacts due to purchasing of inputs for production. Officials of the proposed plant have provided revenue and itemized costs data for construction and annual production. The Center for Agribusiness and Economic Development (CAED) at the University of Georgia has applied these data for estimating economic impacts due to the proposed ethanol production.

Range Fuels, Inc. of Broomfield, CO has developed innovative processes to produce alternative energy fuels which are renewable, sustainable, and protective of the environment. The technology utilizes otherwise useless products from timber harvesting for conversion into cellulosic ethanol. With a large timber industry, this technology makes Georgia a highly desirable location for alternative energy production. Use of timber waste products creates a value-added activity for the Georgia forest industry.

Officials of Range Fuels state that the plant will produce 49 million gallons of ethanol and methanol per year. Construction costs for the plant total \$225.0 million, not including land. Expectations are for plant annual revenues of \$93.1 million from ethanol and methanol sales. All feedstock will be acquired from within Georgia, mostly within a 50-mile radius of Treutlen County. Consultations with representatives of the Georgia Forestry Commission indicate that Treutlen County has sufficient capacity to supply 10% of feedstock needs.

### **Principles of Economic Impact Analysis**

Economic impacts can be estimated with input-output models (IMPLAN) that separate the economy into various industrial sectors such as agriculture, construction, manufacturing, trade, and services. The input-output model then calculates how a change in one industry changes output, income, and employment in other industries. These changes, or impacts, are expressed in terms of direct and indirect effects. Impacts are interpreted as the contribution of the enterprise to the total economy. Direct effects represent the initial impact on the economy of either construction or operations of an enterprise. Indirect effects are changes in other industries caused by direct effects of an enterprise and include changes in household spending due to changes in economic activity generated by direct effects. Thus, the total economic impact is the sum of direct and indirect effects. Input-output analysis can interpret the effects of an enterprise in a number of ways including output (sales), labor income (employee compensation and proprietary income), employment (jobs), and tax revenue.

Economic impacts result from a multiplier effect that begins with expenditures of an enterprise stimulating business to business spending, personal income, employment, and tax revenue. IMPLAN models include a regional purchase coefficient (RPC) for each impact variable that represents percentage of demand that is satisfied by production within an impact area. Demand for inputs not satisfied within the impact area represent leakages that have no indirect impacts in the impact area. Enterprises vary in their multiplier effects due to differing expenditure levels,

RPC's, and sectors in which their expenditures are directed. Impact analysis involves quantification of spending levels and proper allocation to impacted sectors.

Output impacts are a measure of economic activity that results from enterprise expenditures in a specific industrial sector. Output is equivalent to sales, and this multiplier offers insights into how initial economic activity in one sector leads to sales in other sectors. Personal income impacts measure purchasing power that is created due to the output impacts. This impact provides the best measure of how standards of living are affected for residents in the impact area.

An enterprise involves a specified number of employees that is determined by the technology of the enterprise. Employment multipliers indicate the effect on employment resulting from the enterprise initiating economic activity. IMPLAN indirect employment includes both full-time and part-time jobs without any distinction. Jobs calculated within an IMPLAN industrial sector are not limited to whole numbers and fractional amounts represent additional hours worked without an additional employee. With no measure of hours involved in employment impacts, IMPLAN summations for industrial sectors which include fractional employment represent both jobs and job equivalents. Since employment may result from some employees working additional hours in existing jobs, instead of terming indirect employment impacts as "creating" jobs, a more accurate term is "involving" jobs or job equivalents.

### **Economic Impacts of Ethanol Plant Construction**

One-time economic impacts to the Georgia economy due to plant construction are presented in Table 1. Direct impact of \$30.4 million is equal to construction expenditures in Georgia. The difference between total construction costs of \$225.0 million and the direct output impact indicates significant leakages from the Georgia economy. Construction of the plant involves 313 jobs in Georgia with wages and benefits of \$12.7 million. Direct jobs are equivalents based on the structure of the Georgia economy, and the actual number of individuals involved in construction may differ from the 313 jobs indicated by the direct employment impact. Indirect output is \$20.5 million for a total output impact of \$50.9 million. Indirect employment and labor income impacts lead to total labor income of \$19.5 million for 489 jobs, or \$39,888 per job in wages and benefits. Taxes generated total \$1.8 million of which \$1.0 million goes to the state government, and \$767,275 goes to local governments throughout Georgia. Appendix 1 shows the allocation of economic impacts among major industrial sectors of the Georgia economy due to ethanol plant construction.

Table 1. Plant Construction: One-time Georgia Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output (\$)	30,426,636	20,512,654	50,939,290
Labor Income (\$)	12,727,835	6,777,592	19,505,427
Employment	313	176	489
State Taxes (\$)			999,260
Local Taxes (\$)			767,275
Sum of Taxes (\$)			1,766,535

## Economic Impacts of Ethanol Production

Operation of the ethanol plant in Treutlen County creates annual economic impacts within the local economy. Direct output impact of \$93.1 million in Table 2 is equal to the value of annual sales. Direct labor income of \$3.0 million for 69 employees is ethanol plant expense for wages and benefits. Average wages and benefits for ethanol plant employees are \$43,348 per year. Indirect economic activity in Treutlen County of \$12.6 million leads to a total output impact of \$105.7 million. Indirect output leads to indirect labor income of \$2.8 million for 125 jobs. Total labor income in Treutlen County is \$5.8 million for 194 jobs which averages \$30,016 per job. State taxes of \$514,424 in Table 2 are for economic activity occurring in Treutlen County. Local taxes of \$498,781 in the county result in total tax revenue of over \$1.0 million. Treutlen County officials state the proposed ethanol plant has a property tax abatement, and there are no property taxes in this analysis. Appendix 2 shows economic impacts among major industrial sectors of the Treutlen County economy.

Table 2. Ethanol Production: Annual County Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output (\$)	93,100,000	12,565,335	105,665,335
Labor Income (\$)	2,991,000	2,832,029	5,823,029
Employment	69	125	194
State Taxes <sup>1</sup> (\$)			514,424
Local Taxes <sup>1</sup> (\$)			498,781
Sum of Taxes <sup>1</sup> (\$)			1,013,206

<sup>1</sup>Does not include sales or fuel taxes on ethanol sales.

Production in Treutlen County creates economic impacts in surrounding counties. One county has limited capacity to provide inputs for an enterprise, and this leads to indirect impacts in other local economies as inputs are purchased in other counties. The state of Georgia has designated 12 state service delivery regions (SDR) in order to foster regional collaboration in economic development. Treutlen County is in SDR 9 which also includes the counties: Appling, Bleckley, Candler, Dodge, Emanuel, Evans, Jeff Davis, Johnson, Laurens, Montgomery, Pulaski, Tattnall, Telfair, Toombs, Wayne, Wheeler, and Wilcox. Table 3 shows the regional economic impact for SDR 9. Direct impacts are identical to Table 2. Indirect impacts increase as the larger regional economy has greater supporting capacity for production inputs than a single county. The total output impact to the region is \$138.1 million. Total labor income of \$13.6 million is created for 432 jobs which is a \$31,432 average in wages and benefits. State and local taxes generated due to impacts in the region are \$2.4 million. Appendix 3 shows economic impacts among major industrial sectors in SDR 9.

Table 3. Ethanol Production: Annual Regional Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output (\$)	93,100,000	44,975,815	138,075,815
Labor Income (\$)	2,991,000	10,587,535	13,578,535
Employment	69	363	432
State Taxes <sup>1</sup> (\$)			1,315,029
Local Taxes <sup>1</sup> (\$)			1,083,619
Sum of Taxes <sup>1</sup> (\$)			2,398,648

<sup>1</sup>Does not include sales or fuel taxes on ethanol sales.

Expanding the impact area to include all of Georgia indicates the economic impacts from the Treutlen County plant to the state economy. Indirect impacts are greater in Table 4 than impacts for county and regional economies. Total output is \$150.3 million for the state economy. A total of \$17.6 million in labor income is created for 444 jobs. Indirect wages and benefits average \$38,904 per job, and the average for all jobs is \$39,594. The state treasury realizes a total of \$1.6 million per year from production, while local governments in Georgia receive \$1.3 million. Appendix 4 shows economic impacts among major industrial sectors in the Georgia economy.

Table 4. Ethanol Production: Annual Georgia Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output (\$)	93,100,000	57,179,512	150,279,512
Labor Income (\$)	2,991,000	14,588,910	17,579,910
Employment	69	375	444
State Taxes <sup>1</sup> (\$)			1,646,332
Local Taxes <sup>1</sup> (\$)			1,312,718
Sum of Taxes <sup>1</sup> (\$)			2,959,050

<sup>1</sup>Does not include sales or fuel taxes on ethanol sales.

## Summary

Construction of a plant for wood cellulosic ethanol production in Treutlen County would create a one-time economic impact leading to \$19.5 million in labor income for 489 jobs in Georgia. Operation of the plant would create an annual \$105.7 million output impact in Treutlen County. Total labor income of \$5.8 million would be created annually for 194 jobs in the county. Local governments in the county would receive \$498,781 annually in tax revenues due to ethanol production, not including taxes on ethanol sales. Regional impacts for an area of 18 counties including Treutlen County lead to a labor income impact of \$13.6 million for 432 jobs in the

region. Production at the plant would generate a total output impact of \$150.3 million for the state economy. Employees in Georgia would earn \$17.6 million in wages and benefits for 444 jobs. The state treasury would receive \$1.6 million annually, and local treasuries throughout the state would receive \$1.3 million from operations related to ethanol production.



Appendix 1. Plant Construction: One-time Economic Impacts to Major Sectors,  
Georgia

Sector	Output (\$)	Labor	
		Income (\$)	Employment
Agriculture	163,914	48,528	2
Mining & Construction	17,472,849	9,397,328	227
Utilities	564,394	113,562	1
Manufacturing	11,908,074	2,474,719	57
Transportation, Warehousing	1,077,576	442,117	10
Trade	4,045,917	1,557,273	42
Finance, Insurance, & Real Estate	2,991,551	818,892	17
Services	10,794,011	4,573,527	132
Government and non-NAICS	1,921,005	79,482	2
Total	50,939,290	19,505,427	489

Appendix 2. Ethanol Production: Annual Economic Impacts to Major Sectors,  
County

Sector	Output (\$)	Labor	
		Income (\$)	Employment
Agriculture	2,111,033	373,907	13
Mining & Construction	62,995	21,822	1
Utilities	1,651,804	337,497	7
Manufacturing	93,119,150	2,994,473	69
Transportation, Warehousing	399,342	148,617	6
Trade	2,159,982	757,522	39
Finance, Insurance, & Real Estate	1,036,282	251,151	7
Services	1,863,003	862,179	50
Government and non-NAICS	3,261,745	75,861	2
Total	105,665,335	5,823,029	194

Appendix 3. Ethanol Production: Annual Economic Impacts to Major Sectors,  
Region

Sector	Output (\$)	Labor	
		Income (\$)	Employment
Agriculture	19,786,366	3,631,775	119
Mining & Construction	112,121	48,929	2
Utilities	6,319,239	1,281,525	10
Manufacturing	93,960,154	3,146,315	74
Transportation, Warehousing	672,908	270,619	7
Trade	4,607,800	1,701,478	65
Finance, Insurance, & Real Estate	1,505,534	396,017	11
Services	8,619,794	3,029,172	143
Government and non-NAICS	2,491,899	72,707	2
Total	138,075,815	13,578,535	432

Appendix 4. Ethanol Production: Annual Economic Impacts to Major Sectors,  
Georgia

Sector	Output (\$)	Labor	
		Income (\$)	Employment
Agriculture	20,632,720	3,849,895	111
Mining & Construction	277,472	113,163	2
Utilities	6,363,750	1,291,256	9
Manufacturing	96,803,340	3,426,461	77
Transportation, Warehousing	1,047,598	424,252	9
Trade	6,011,415	2,259,269	61
Finance, Insurance, & Real Estate	4,439,924	1,226,146	24
Services	12,162,831	4,897,695	149
Government and non-NAICS	2,540,463	91,773	2
Total	150,279,512	17,579,910	444

# **The Center for Agribusiness & Economic Development**



The Center for Agribusiness and Economic Development is a unit of the College of Agricultural and Environmental Sciences of the University of Georgia, combining the missions of research and extension. The Center has among its objectives:

To provide feasibility and other short term studies for current or potential Georgia agribusiness firms and/or emerging food and fiber industries.

To provide agricultural, natural resource, and demographic data for private and public decision makers.

To find out more, visit our Web site at: <http://www.caed.uga.edu>

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**J. Scott Angle, Dean and Director**